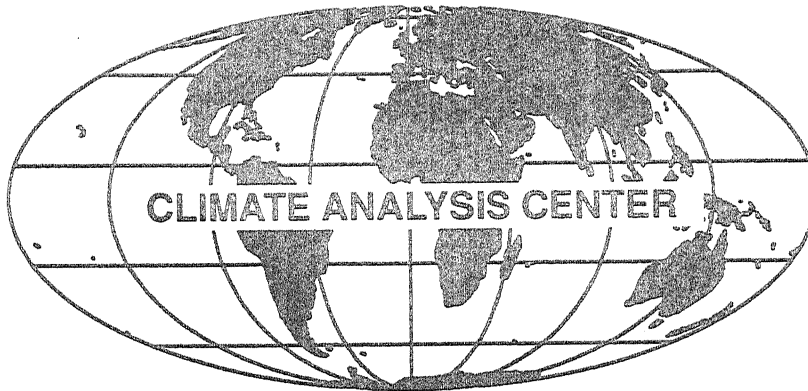


CONTAINS:

**UPDATE ON
MIDWESTERN
FLOODS AND
SOUTHEASTERN
DRYNESS**

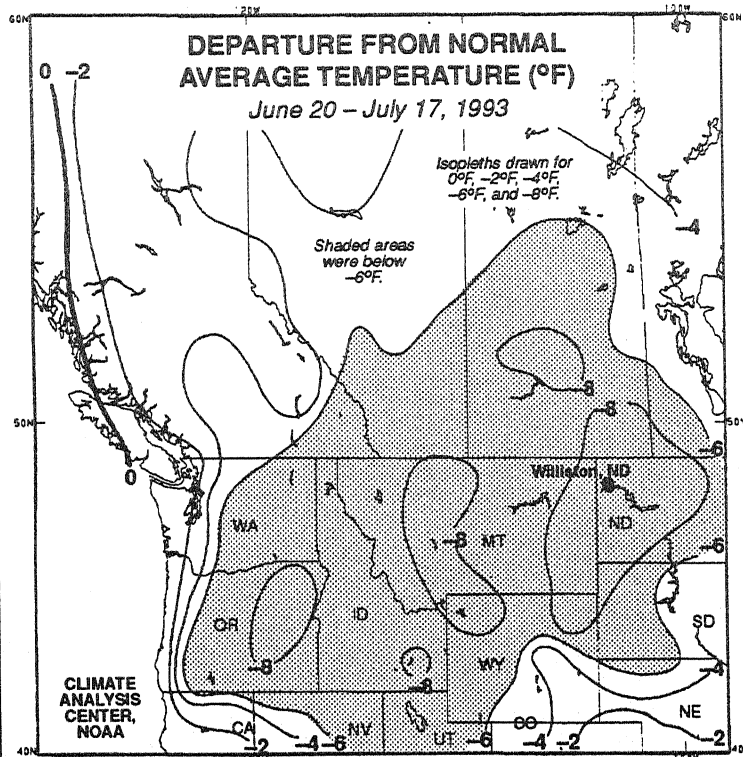


WEEKLY CLIMATE BULLETIN

No. 93/29

Washington, DC

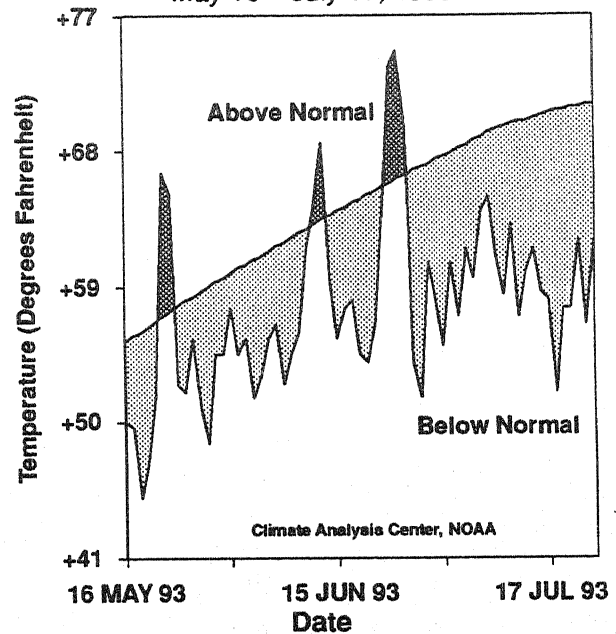
July 21, 1993



DAILY MEAN TEMPERATURE

Williston, North Dakota

May 16 - July 17, 1993



UNSEASONABLY COOL WEATHER COVERS CENTRAL AND WEST-CENTRAL NORTH AMERICA. While flooding plagued the river valleys of the continent's midsection and incipient dryness damaged crops in the Southeast, a third climatic anomaly was affecting the northwestern U.S. and southwestern Canada. Well below normal temperatures blanketed the entire region during the last four weeks, and date back to mid-May in a few areas across the northwestern Plains and southeastern Canadian Prairies. Since June 20, large sections of the Dakotas, western and eastern Montana, northeastern Wyoming, and eastern Oregon averaged at least 8°F below normal. Subfreezing readings were recorded in parts of southern Colorado and eastern Oregon, and highs averaged only in the upper 60's or lower 70's for the 28-day period across North Dakota, most of Montana, central and northern Colorado, and the Pacific Northwest. The Canadian Prairies recorded average daily maxima of only 61°F to 69°F. According to press reports, the persistently cool weather was hampering crops in Saskatchewan, where development was a week to ten days behind normal. At Williston, ND, where the cool spell dates back to mid-May, only five of the last 63 days averaged warmer than normal. For more information on the Midwestern flooding and the dryness in the Southeast, refer to the update on pages five and six.



UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE-NATIONAL METEOROLOGICAL CENTER
CLIMATE ANALYSIS CENTER



WEEKLY CLIMATE BULLETIN

This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

- Highlights of major climatic events and anomalies.
- U.S. climatic conditions for the previous week.
- U.S. apparent temperatures (summer) or wind chill (winter).
- Global two-week temperature anomalies.
- Global four-week precipitation anomalies.
- Global monthly temperature and precipitation anomalies.
- Global three-month precipitation anomalies (once a month).
- Global three-month temperature anomalies (once a month).
- Global twelve-month precipitation anomalies (every three months).
- Global twelve-month temperature anomalies (every three months).
- Special climate summaries, explanations, etc. (as appropriate).

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Climate Analysis Center via the Global Telecommunications System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

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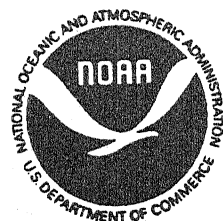
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GLOBAL CLIMATE HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF JULY 17, 1993

1. Northwestern United States and Southwestern Canada:

STILL UNUSUALLY COOL

Temperatures averaged as much as 8°C below normal across much of the region. Since June 20, daily lows averaged under 10°C as far south as northern Nevada and southern Colorado. According to press reports, crop growth in the southern Canada has been delayed by the cool weather, which dates back to mid-May in some areas (see front cover) [3 weeks].

2. North-Central United States:

WET WEATHER AGGRAVATES FLOODING.

Up to 210 mm drenched parts of the region (especially eastern Kansas and southern Minnesota) as six-week moisture surpluses reached as high as 360 mm. Flooding remains widespread along much of the Mississippi-Missouri River Complex and its tributaries (see pages 5 and 6). In addition, Fargo, ND experienced flooding along the Red River, which flows into Lake Winnipeg. Some locations along the upper and middle Mississippi Valley already received more than normal annual totals in 1993 [22 weeks].

3. Eastern United States and Southeastern Canada:

DRYNESS PERSISTS, BUT HEAT-WAVE EASES.

Near normal temperatures returned to most locations as the heat-wave ended by the middle of the week; daily highs had soared to 39°C in parts of Georgia and South Carolina [Ended at 3 weeks]. Except for isolated amounts approaching 40 mm, little or no precipitation was reported. Since April 11, moisture deficits of up to 255 mm accumulated in parts of eastern Georgia, northwestern South Carolina, and northeastern Florida [12 weeks].

4. Mexico:

HEAVY SHOWERS CONTINUE.

Already-saturated portions of Mexico received 75 to 100 mm of rain, with amounts approaching 150 mm at a few locations [4 weeks].

5. Southeastern Europe:

RAINS BRING RELIEF.

Most areas received 20 to 40 mm of rain, easing moisture shortages. Six-week deficits, however, still ranged from 50 to 100 mm in a few areas [Ended at 14 weeks].

6. Southwestern Asia:

WET SPELL ENDS.

Little or no rain fell, except for isolated amounts of up to 40 mm along the Caspian Sea, ending the prolonged wet spell [Ended at 11 weeks].

7. Pakistan and Northwestern India:

ABNORMALLY HEAVY MONSOON RAINS CONTINUE.

Heavy rains (60 to 170 mm) drenched much of the region as six-week moisture surpluses approached 200 mm. According to press reports, more than 200 lives were lost in floods, and rescue operations were hampered by recurrent downpours [5 weeks].

8. Southeastern China:

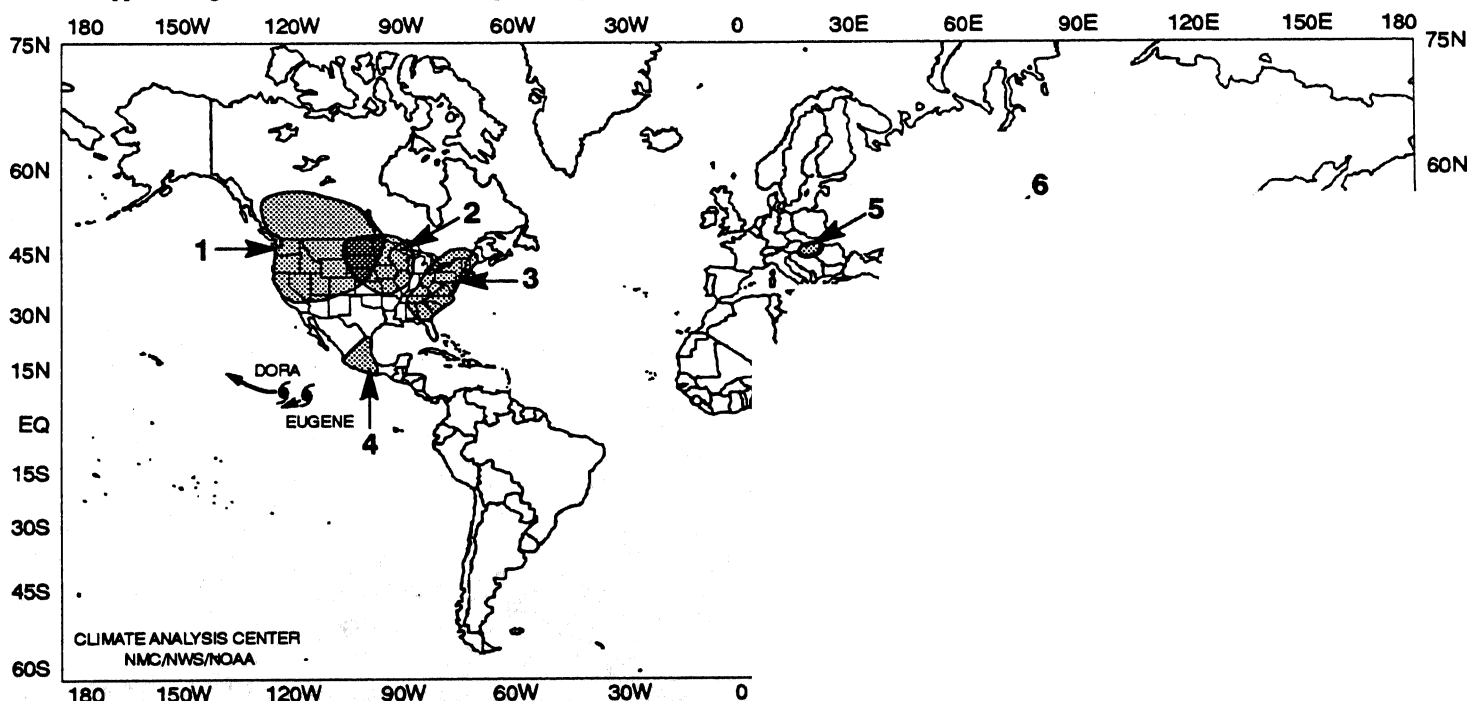
WET WEATHER EASES.

For the second consecutive week, relatively light rains (20 to 70 mm) were reported; however, the western and northern fringes received 75 to 200 mm and six-week moisture surpluses reached 360 mm in some areas [Ending at 14 weeks].

9. Korea, Japan, and Northeastern China:

TORRENTIAL RAINS SOAK REGION.

Northeastern China measured as much as 250 mm of rain last week as six-week precipitation excesses reached 210 mm. Up to 300 mm of rain inundated parts of Korea, where six-week moisture surpluses climbed to 320 mm. Farther east, southwestern Japan was soaked by up to 230 mm, with rainfall excesses accumulating to 840 mm at some locations [13 weeks].



EXPLAN

TEXT: Approximate duration of anomalies is in brackets. Precipitation
MAP: Approximate locations of major anomalies and episodic events
temperature anomalies, four week precipitation anomalies, long

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF JULY 11 – 17, 1993

Severe thunderstorms continued to inundate the northern and central Plains and upper and middle Mississippi Valley with up to eight inches of rain, aggravating the severe flooding that has plagued much of the region for the last month and a half. Officials now estimate crop and property damage at \$10 billion in the Midwest, with at least 31 deaths, 16,000 square miles of farmland underwater, 30,000 homes damaged, and 40,000 individuals forced from their dwellings. All points along the Mississippi River from the Quad cities, IA/IL to Chester, IL reached or will reach record levels with the river cresting in St. Louis, MO at 47 feet, more than three and a half feet above the previous record set in 1973. The lower Missouri River also crested at record levels from St. Joseph, MO to St. Louis. Almost half of the 620 square miles of St. Charles County, MO, near the confluence of the Mississippi and Missouri Rivers, was underwater. The Bayview bridge near Quincy, IL, the last open bridge along a 275-mile stretch from the IA/IL/WI triple point to St. Louis, was closed late Friday when a levee on the Missouri side broke and flooded the access road, according to press reports. Numerous roads, railways, and eleven airports were underwater in the affected area and at least 2,000 barges are trapped on the Mississippi River until the locks are made operational again. Torrential rains also caused flash flooding in Fargo, ND and swelled the Red River to thirty two feet — twenty one feet above flood stage. Near Valley City, ND, a 125-foot bridge was pushed off its footings by the surging Sheyenne River. In Iowa, all 99 counties have been declared Federal disaster areas, with most creeks and streams higher than when they flooded a week ago. As the week ended, eight inches of rain in three hours deluged Sauk County, WI, causing the Baraboo River to rise ten feet in five hours, sweeping cars from roads and undercutting a railroad track.

Elsewhere, extreme heat and prolonged drought conditions are deteriorating crops in the southern Atlantic Coastal States, where many locations have received less than half of normal rainfall since mid-April. Much of the affected area in Virginia, the Carolinas, and Georgia, received only scattered rains this past week, with temperatures averaging 3°F to 7°F above normal.

The week commenced with violent thunderstorms widespread from the central Rockies to the Great Lakes and upper Ohio Valley along a stationary frontal boundary. Intense thunderstorms also erupted in the hot humid air to the south of the front across the central Gulf Coast States. Heavy rains produced street flooding in Vicksburg, MS while seven inches of rain saturated Jasper County, MS. By mid-week, showers and thunderstorms were developing across the central Plains and middle Mississippi Valley, worsening flood conditions, while the northern portion of the frontal system moved eastward, spreading scattered rain across the Northeast and mid-Atlantic. Showers and

thunderstorms also continued to be widely scattered in the hot, muggy air from the southern Rockies to the southern Atlantic coast. A half dozen new high temperature records were set daily across the Southeast and mid-Atlantic. Cool weather and scattered rains prevailed from the northern Pacific coast to the northern Rockies, where nine daily record lows were broken on Tuesday and Wednesday.

During the latter part of the week, strong thunderstorms again battered the central and northern Plains and middle Mississippi Valley. Torrential amounts forced the Red River out of its banks and pushed the lower Missouri and middle Mississippi Rivers to record high levels. Heavy rain also drenched portions of the southern High Plains, the lower Mississippi and Tennessee Valleys, the southern Appalachians, and the Florida peninsula. Cool conditions remained in the Northwest and northern Rockies while hot weather persisted over the Southeast, where several new daily high temperature records were established. Record breaking high temperatures for mid-July also extended across interior Alaska, where temperatures reached into the nineties at Umiat.

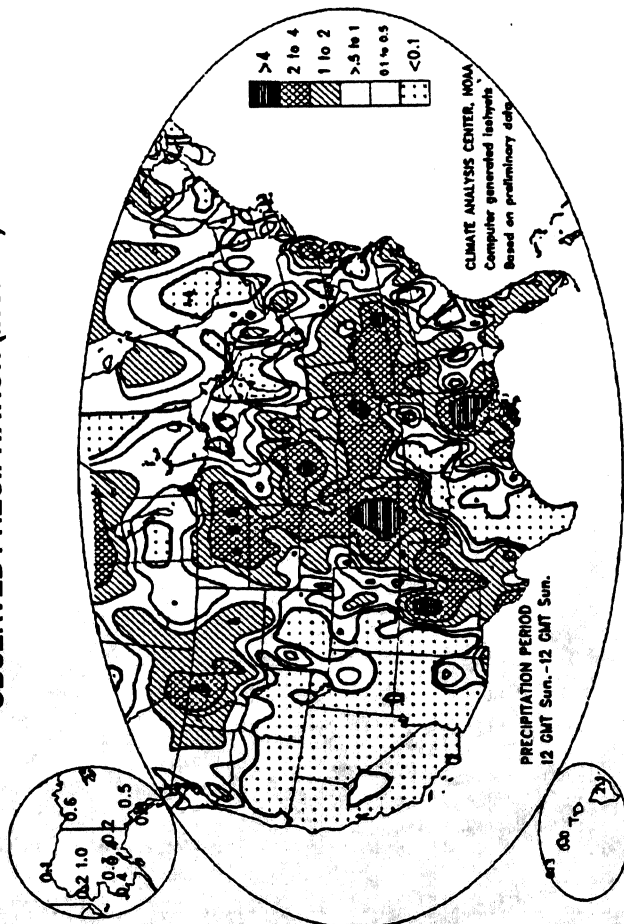
According to the River Forecast Centers, the greatest weekly totals (from two to eleven inches) were recorded across the northeastern, central, and southwestern Plains, the lower and middle Mississippi, lower Ohio, and Tennessee Valleys, and the southern Appalachians. More scattered totals of two or more inches were reported across the Southeast, the central Appalachians, the mid-Atlantic, the Great Lakes, the upper Mississippi Valley, the northern High Plains, the northern and southern Rockies, and southwestern Alaska. Light to moderate amounts were observed in the Northwest, Hawaii, and the remainders of the Rockies, the northern High Plains, southwestern Alaska, and the eastern half of the nation. Little or no precipitation fell on the southeastern Plains, the desert Southwest, the Great Basin, California, and the remainder of Alaska.

Warmer than normal conditions in the contiguous United States prevailed from the Rio Grande Valley eastward and northeastward to the Atlantic coast. Hot weather continued over the mid-Atlantic, Carolinas, Georgia, and lower Ohio Valley early in the week, resulting in weekly departures between +4°F and +7°F. Above normal temperatures also covered Alaska, with weekly departures of up to +13°F at Barrow. Temperatures averaged near to slightly above normal in Hawaii.

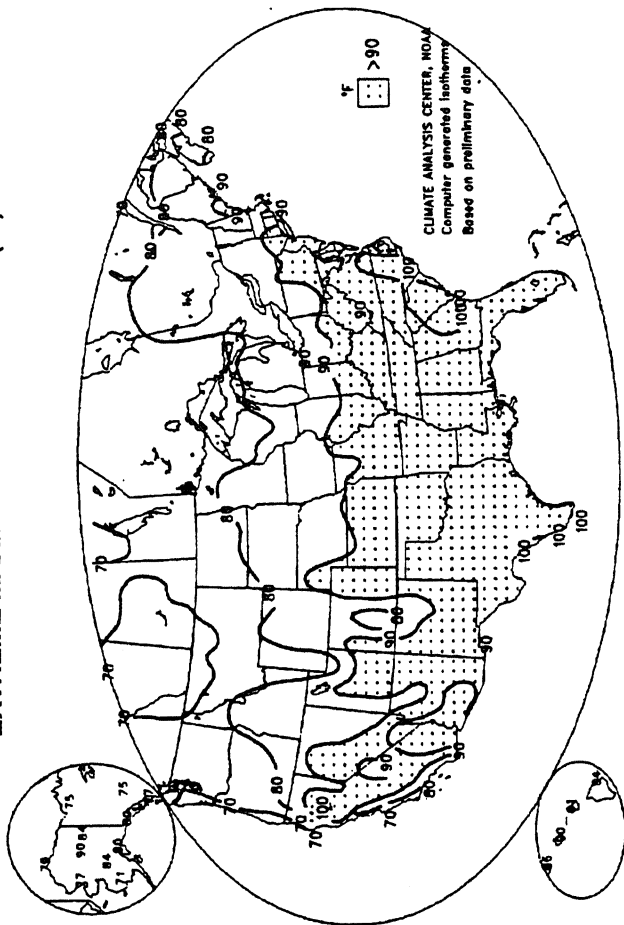
In contrast, unseasonably cool weather dominated from the Pacific Coast eastward to the southwestern and central Plains, middle Mississippi Valley, and Great Lakes. Departures of -7°F to -15°F were common from the interior Northwest to the upper Great Lakes, with temperatures dipping into the thirties across the northern Rockies.

UNITED STATES WEEKLY CLIMATE CONDITIONS (July 11 - 17, 1993)

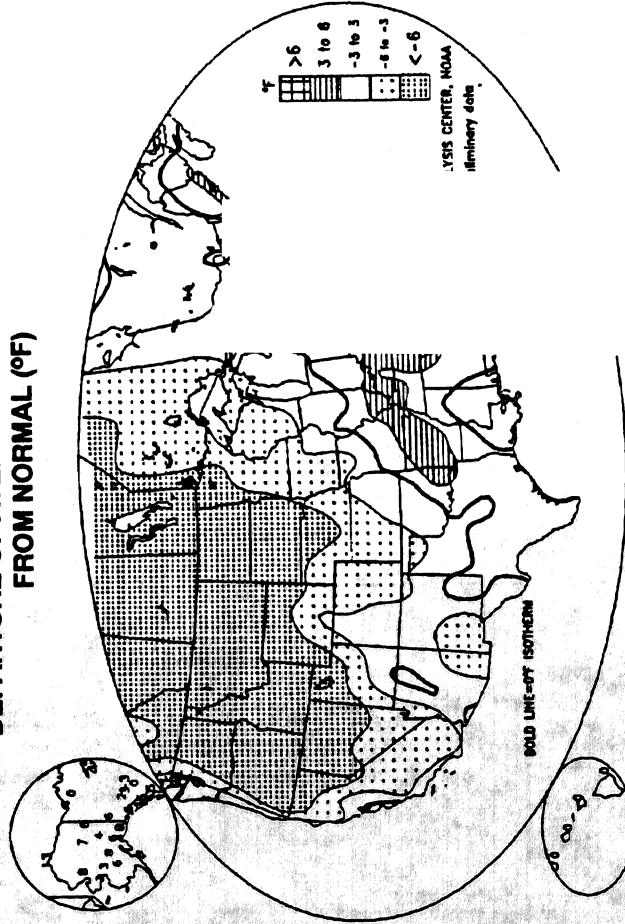
OBSERVED PRECIPITATION (INCHES)



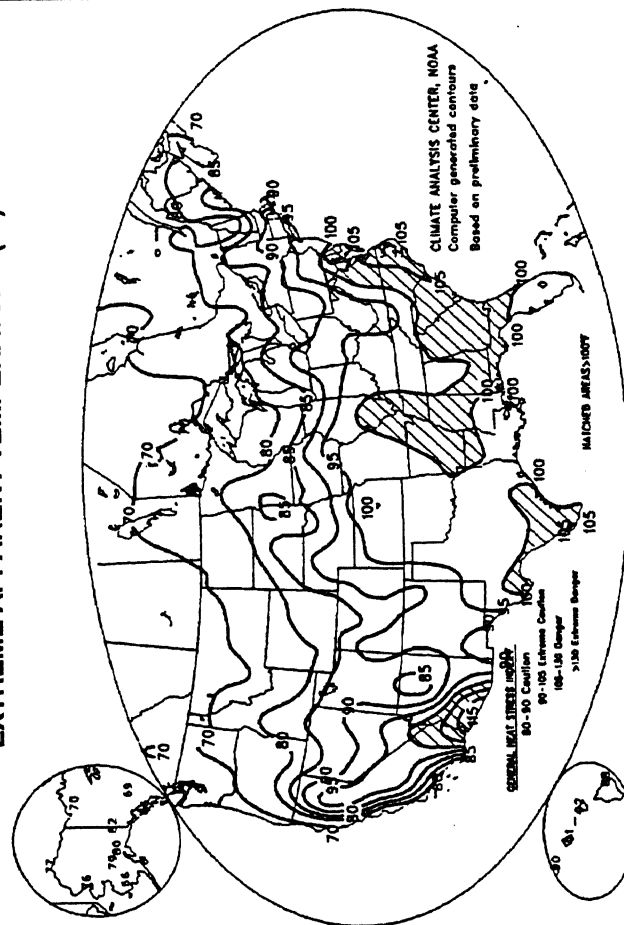
EXTREME MAXIMUM TEMPERATURE (°F)



DEPARTURE OF AVERAGE TEMPERATURE
FROM NORMAL (°F)

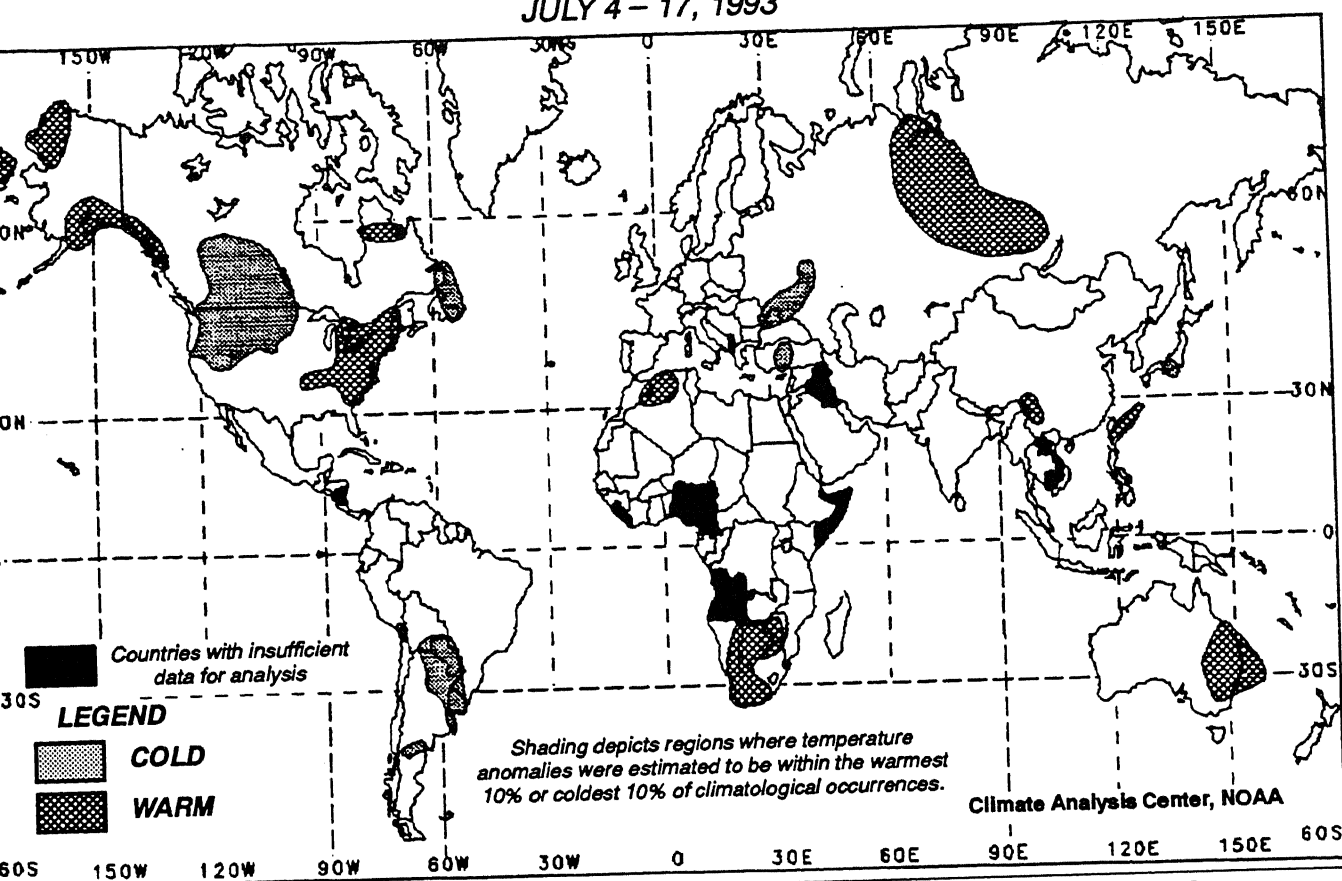


EXTREME APPARENT TEMPERATURE (°F)



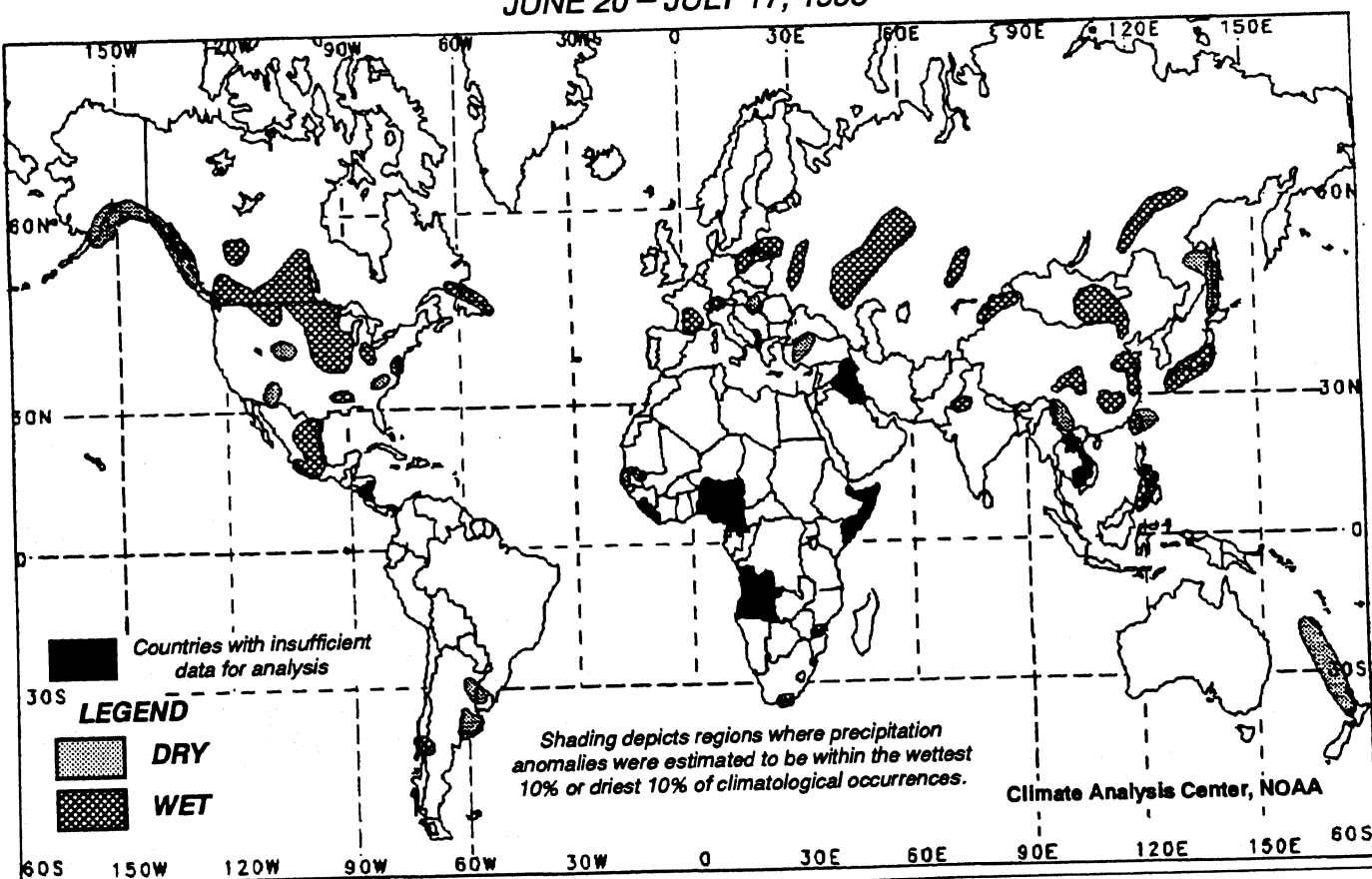
TWO-WEEK GLOBAL TEMPERATURE ANOMALIES

JULY 4 – 17, 1993

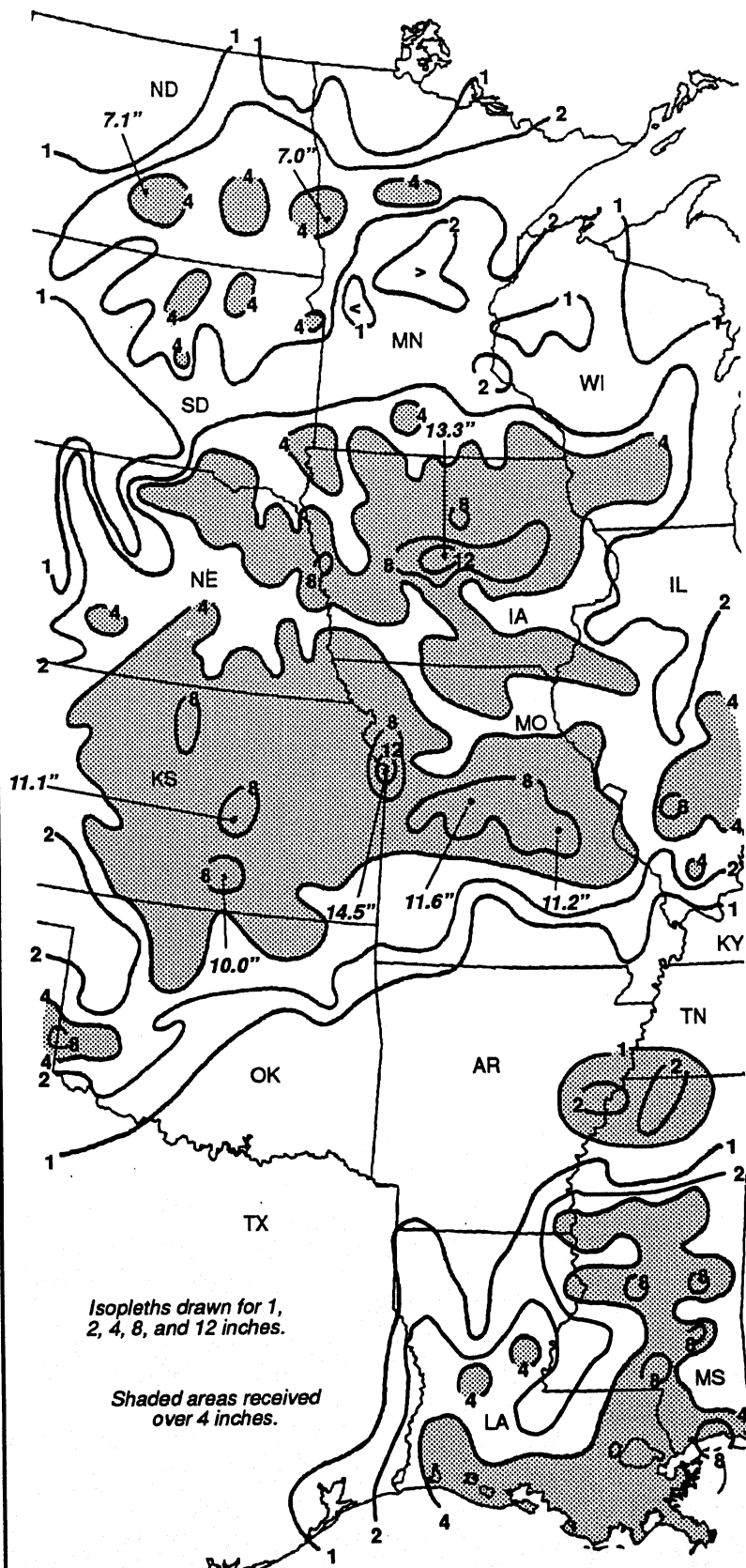


FOUR-WEEK GLOBAL PRECIPITATION ANOMALIES

JUNE 20 – JULY 17, 1993



TOTAL PRECIPITATION (IN)
July 6 – 17, 1993



Isopleths drawn for 1, 2, 4, 8, and 12 inches.

Shaded areas received over 4 inches.

CLIMATE ANALYSIS CENTER, NOAA

SPECIAL CLIMATE UPDATE

*Analysis and Information Branch
Climate Analysis Center, NMC
National Weather Service, NOAA*

FLOODS CONTINUE ACROSS MIDWEST

DRYNESS INTENSIFIES AS HEAT WAVE EASES IN THE EAST

Since the last update (in Weekly Climate Bulletin #93/27, dated July 7, 1993), heavy rains have continued to pound much of the upper and middle Mississippi Valley and the valleys of many of the Mississippi's tributaries, including the lower and middle Missouri, the Iowa, the Racoon, the Black, the Des Moines, and the Baraboo River Valleys. Over ten inches of rain deluged parts of Iowa and central and western Missouri during the period, with many areas receiving at least four inches in the last eleven days (page 5). According to press reports, a continuation of or an increase in the region's severe flooding resulted from the relentless downpours that again drenched the nation's midsection.

Press reports describe a multitude of impacts which have afflicted the region. We feel it worthwhile to repeat some of the more reliable sources, but wish to emphasize that all numbers quoted from press reports are unofficial and preliminary.

According to press reports, the flooding across the Midwest has damaged at least 30,000 dwellings, taken 31 lives, inundated over 16,000 square miles (10,240,000 acres) of farmland, and caused approximately \$10 billion in crop losses and property damage. The Mississippi River level reached 46.9 feet at St. Louis, MO on Sunday (7/18), which is more than 3 1/2 feet higher than the previous record level of 43.3 feet measured in 1973. According to the Army Corps of Engineers, the river level at St. Louis will remain above flood stage at least through early August, and 36 of the 72 steps leading up to the St. Louis Arch have been submerged. All bridges crossing the Mississippi River along a 275-mile stretch from the IA/IL/WI triple point to St. Louis, MO had to be closed, severely impacting regional travel and some local economies. According to local officials, approximately 40% of the economy in Quincy, IL is dependent on cross-river traffic. Much of the upper half of the Mississippi River remains closed to navigation; more than 2,000 barges remain stranded at various locations, and will continue to be stranded until the locks are re-opened. The Mississippi River flow rate observed at St. Louis is the third greatest on record, at 975,000 cubic feet per second, surpassed only by flow rates recorded in 1903 (1.019 million cubic feet per second) and 1844 (1.3 million cubic feet per second). The man-made system of levees and dams erected along the River has caused higher levels to be generated by lesser volumes of water.

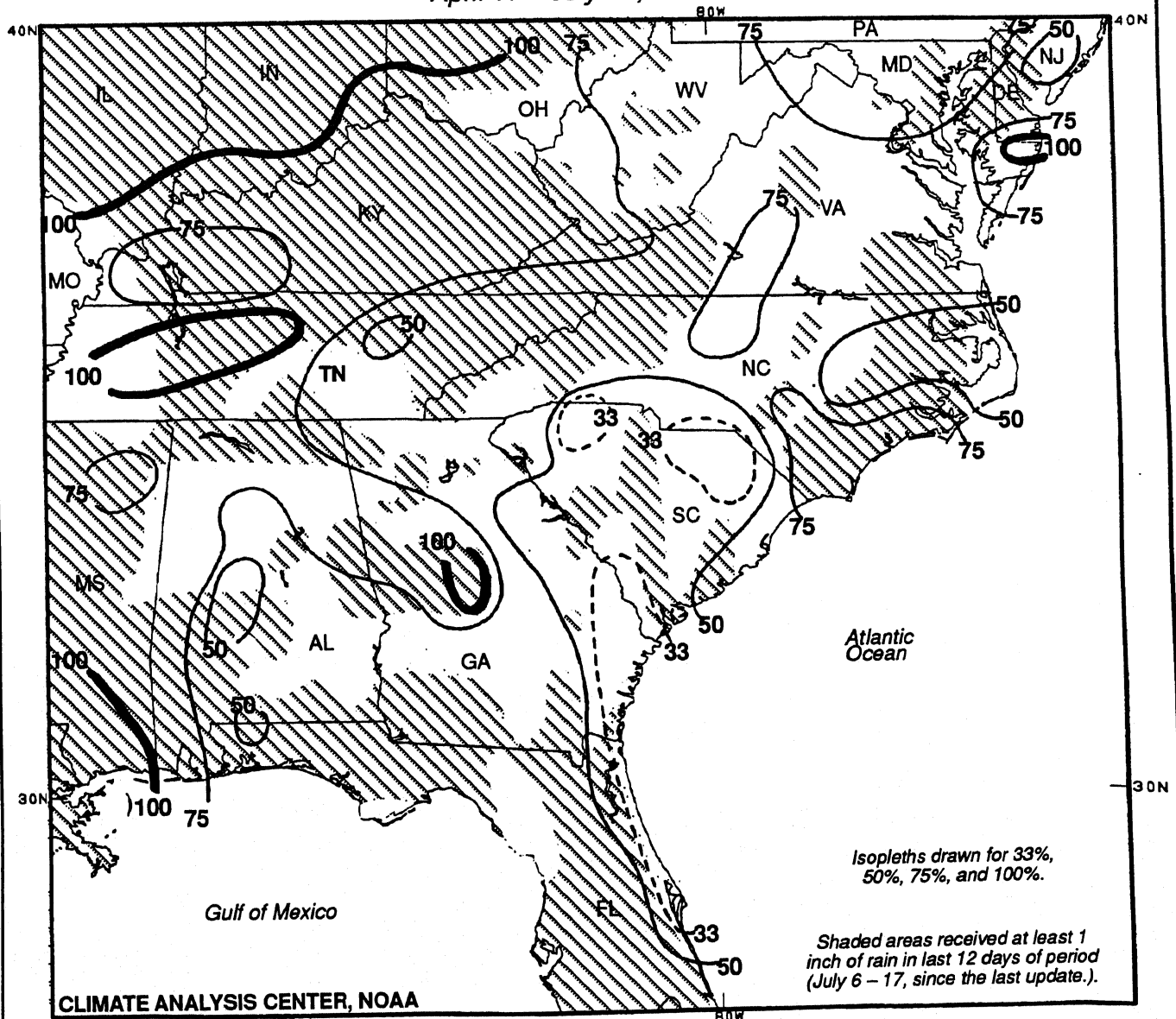
Much of the Missouri River also remains closed to navigation, and, like many points along the Mississippi, several locations reported the highest river level on record. Severe flooding occurred as a levee near the confluence of the Missouri and Mississippi Rivers broke, allowing the rivers to merge 20 miles farther north than normal. As a result, more than half of the 620-square-mile territory of St. Charles County, MO was submerged. The massive Midwestern floods have forced all 99 Iowa counties to be declared Federal disaster areas, as well as large sections of most states adjacent of the Mississippi and Missouri Rivers. In addition, last week's rains caused a ten foot rise in the level of the Baraboo River in Wisconsin within five hours, resulting in severe flash flooding. Farther west, heavy rains forced the Red River out of its banks near Fargo, ND. Fortunately for Midwesterners, this river flows northward into Lake Winnipeg and is not part of the Mississippi/Missouri complex.

The Midwestern flooding has been an agricultural as well as a hydrological disaster. Official statistics released by the Department of Agriculture indicate that a 10% drop in soybean production and a 17% drop in corn output (compared with last year's totals) is likely as a direct result of the flooding, resulting in losses of approximately \$1.7 billion.

Meanwhile, severely dry conditions continue to take an agricultural toll on the Southeast. Since mid-April, much of eastern Florida and Georgia, most of South Carolina, and southern and eastern North Carolina received less than half of normal rainfall, with only 1/3 of normal or less reported in some areas (page 6). During the last twelve days of the period (since our last update), over an inch of rain fell on significant sections of the southeastern quarter of the country, but these totals are only at or slightly above normal for early July, allowing large deficits to remain. Furthermore, the rains seemed to miss the most severely affected areas of South Carolina and Georgia. According to the Department of Agriculture, 57% of North Carolina corn is in poor or very poor condition, and 31% of Georgia corn is poor or very poor. In addition, 35% of North Carolina soybeans, 37% of Georgia soybeans, and 69% of South Carolina soybeans are in poor or very poor condition. Little or none of the soybean crop in South Carolina is rated good or excellent, and only 8% of North Carolina corn is good or excellent.

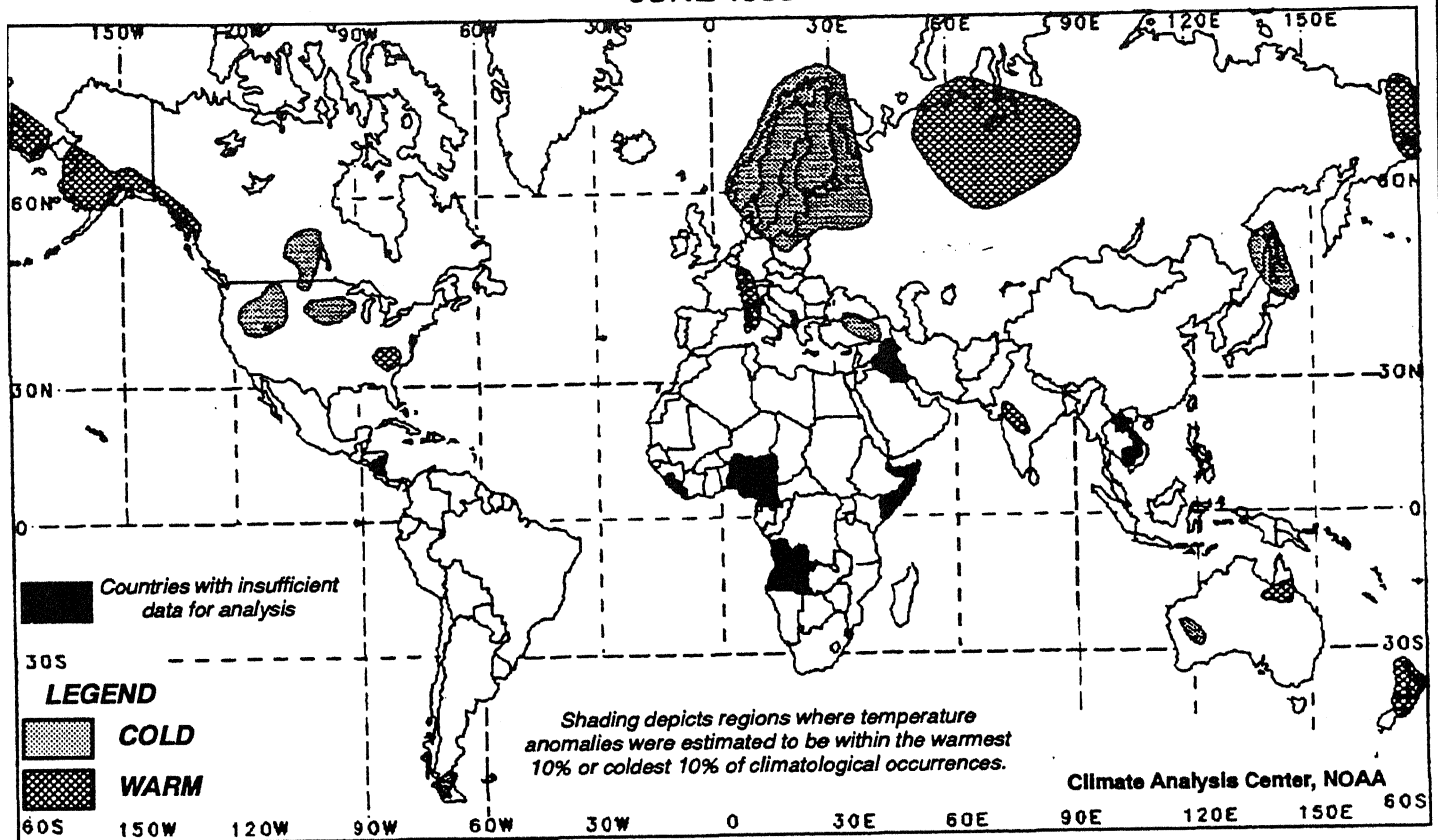
PERCENT OF NORMAL PRECIPITATION

April 11 - July 17, 1993



MONTHLY GLOBAL TEMPERATURE ANOMALIES

JUNE 1993

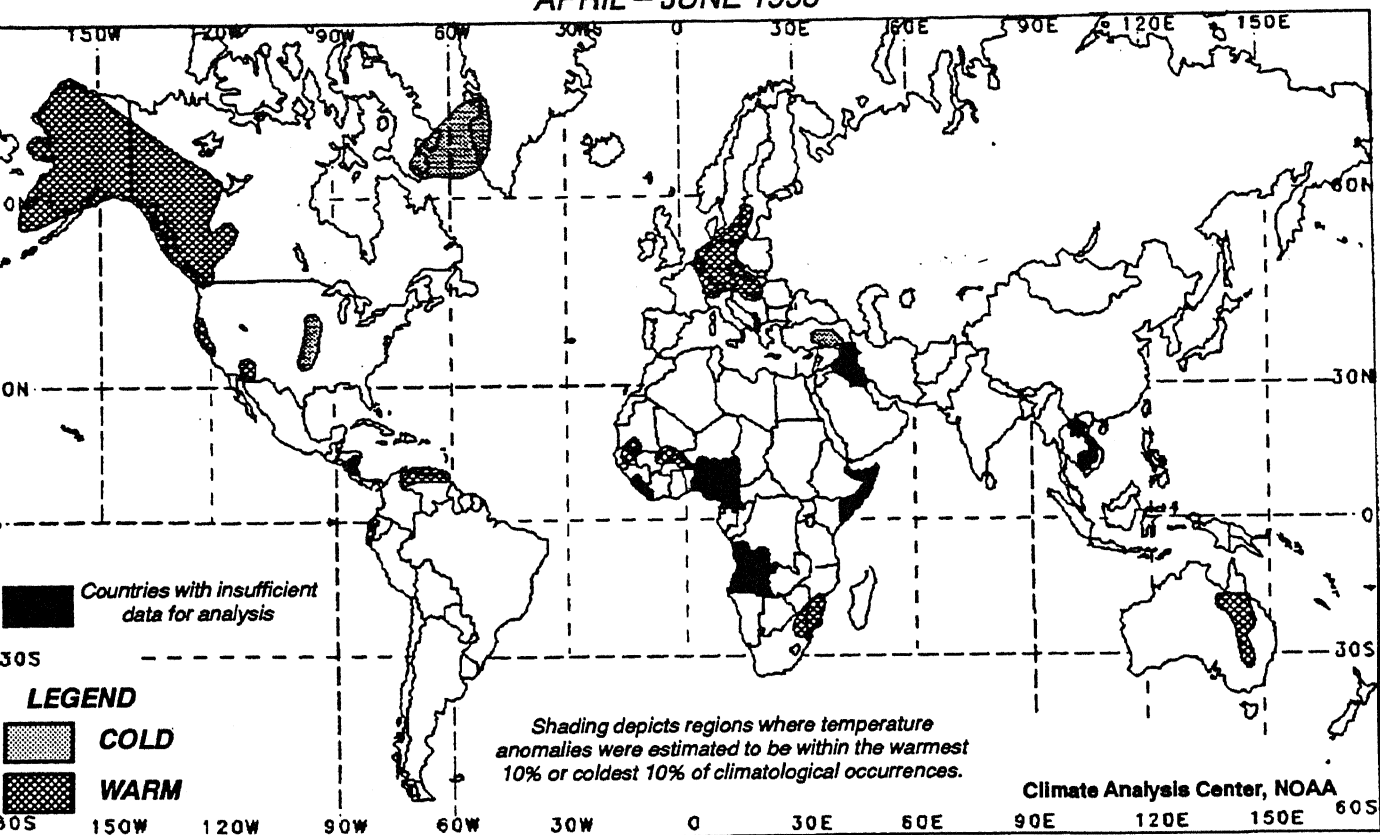


MONTHLY GLOBAL PRECIPITATION ANOMALIES

JUNE 1993

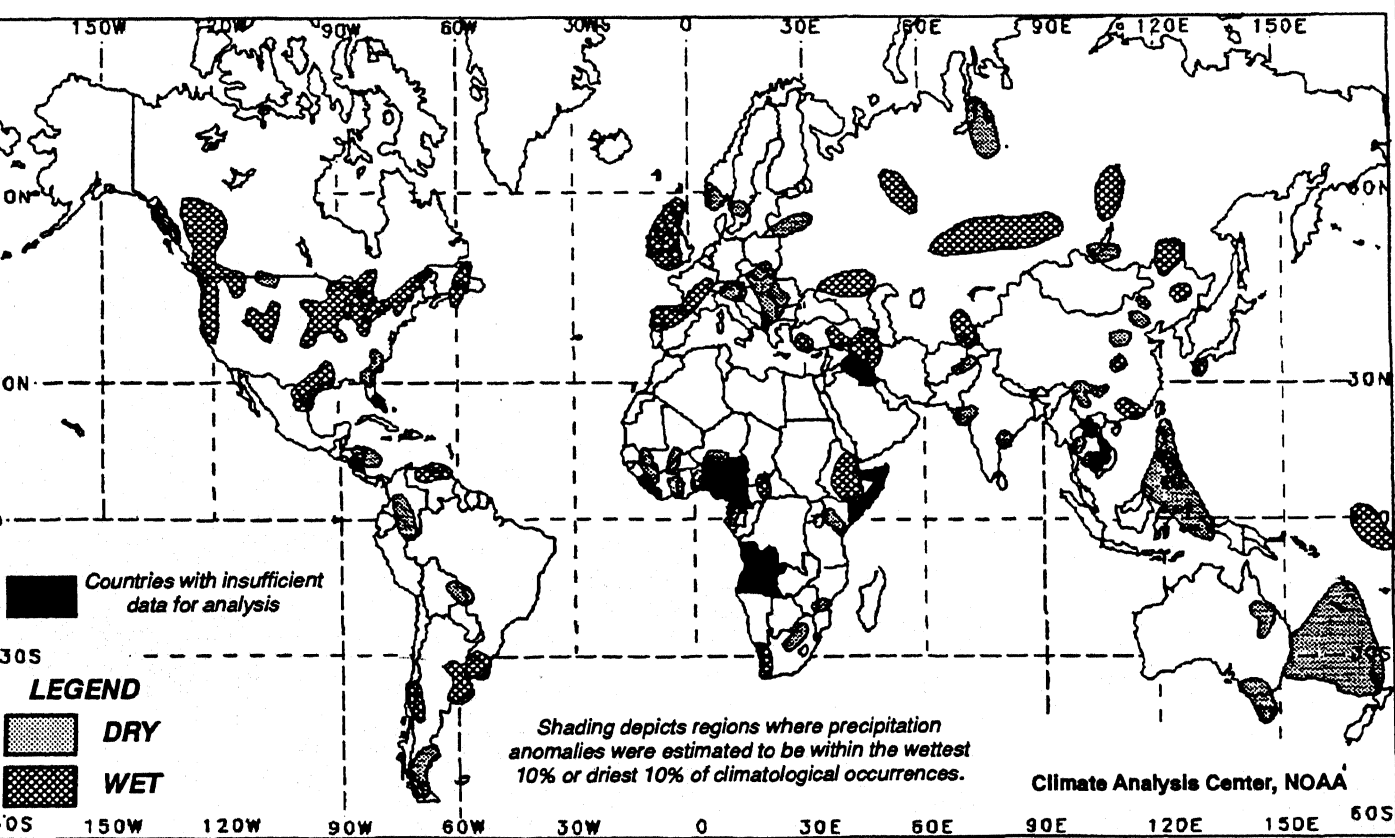
THREE-MONTH GLOBAL TEMPERATURE ANOMALIES

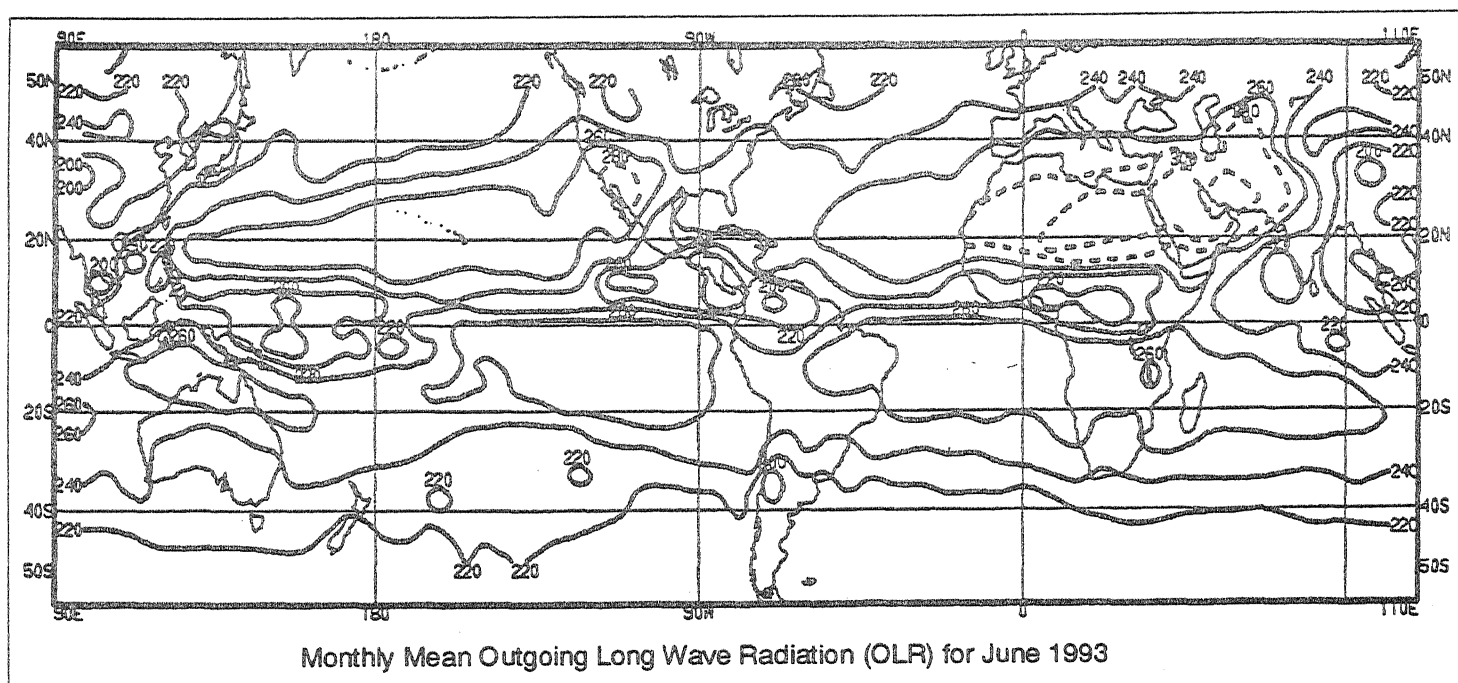
APRIL - JUNE 1993



THREE-MONTH GLOBAL PRECIPITATION ANOMALIES

APRIL - JUNE 1993





EXPLANATION

The mean monthly outgoing long wave radiation (OLR) as measured by the NOAA-9 AVHRR IR window channel by NESDIS/SRL (top). Data are accumulated and averaged over 2.5° areas to a 5° Mercator grid for display. Contour intervals are 20 Wm^{-2} , and contours of 280 Wm^{-2} and above are dashed. In tropical areas (for our purposes $20^\circ\text{N} - 20^\circ\text{S}$) that receive primarily convective rainfall, a mean OLR value of less than 200 Wm^{-2} is associated with significant monthly precipitation, whereas a value greater than 260 Wm^{-2} normally indicates little or no precipitation. Care must be used in interpreting this chart at higher latitudes, where much of the precipitation is non-convective, or in some tropical coastal or island locations, where precipitation is primarily orographically induced. The approximate relationship between mean OLR and precipitation amount does not necessarily hold in such locations.

The mean monthly outgoing long wave radiation anomalies (bottom) are computed as departures from the 1979 - 1988 base period mean. Contour intervals are 15 Wm^{-2} , while positive anomalies (greater than normal OLR, suggesting less than normal cloud cover and/or precipitation) are dashed and negative anomalies (less than normal OLR, suggesting greater than normal cloud cover and/or precipitation) are solid.

